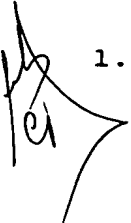


## Claims:

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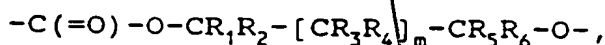
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1. A method for the preparation of a polymer electrolyte electrochemical cell using an electrolyte precursor, said precursor comprising one or more solvents, one or more salts and a polymer which dissolves in the solvent at a first temperature ( $T_{\text{dissol}}$ ) and which is capable of forming a gel on subsequent cooling following heating to a second temperature ( $T_{\text{gel}}$ ),  $T_{\text{dissol}}$  being lower than  $T_{\text{gel}}$ , which method comprises:
  - (a) heating the electrolyte precursor to  $T_{\text{dissol}}$ ;
  - (b) optionally cooling the electrolyte precursor;
  - (c) incorporating the electrolyte precursor into the electrochemical cell;
  - (d) heating the electrochemical cell to  $T_{\text{gel}}$ ;
  - (e) cooling the polymer electrochemical cell to ambient temperature to bring about gelling of the polymer electrolyte
2. A method according to claim 1, in which said polymer is a homopolymer or copolymer from the group of monomers of vinyl fluoride, vinylidene fluoride, trifluoroethylene, tetrafluoroethylene and hexafluoropropylene.
3. A method according to claim 2, in which said polymer is a copolymer of vinylidene fluoride and hexafluoropropylene.

4. A method according to claim 3, in which said copolymer of vinylidenefluoride and hexafluoropropylene has a molecular weight in the range 50.000-500.000, more preferably 100.000-300.000, and a weight ratio of vinylidenefluoride and hexafluoropropylene in the range 80:20 to 90:10.

5. A method according to <sup>Claim 1</sup> ~~any of claims 1 to 4~~, in which the electrolyte comprises one or more solvent(s) selected from the groups (a) to (e):

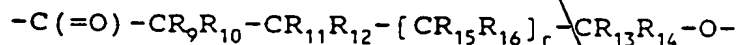
(a) alicyclic carbonates represented by the following general formula:



wherein each of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$  and  $R_6$  independently represents hydrogen or a  $C_1$ - $C_4$  alkyl group and  $m$  is 0 or 1, preferably ethylene carbonate or propylene carbonate;

(b) aliphatic carbonates represented by the general formula  $R_7[OC(O)]_pOR_8$ , wherein each of  $R_7$  and  $R_8$  independently represents a  $C_1$ - $C_4$  alkyl group, and  $p$  is an integer equal to 1 or 2, preferably dimethyl carbonate or diethyl carbonate;

(c) lactones in the form of cyclic esters represented by the general formula:



wherein each of  $R_9$ ,  $R_{10}$ ,  $R_{11}$ ,  $R_{12}$ ,  $R_{13}$ ,  $R_{14}$ ,  $R_{15}$  and  $R_{16}$  independently represents hydrogen or a  $C_{1-2}$  alkyl group and  $r$  is 0 or 1, preferably  $\gamma$ -valerolactone and/or  $\gamma$ -butyrolactone;

(d) esters represented by the formula  $R_{17}[C(O)]OR_{18}[OR_{19}]_t$ , wherein each of  $R_{17}$ ,  $R_{18}$  and  $R_{19}$  independently represents hydrogen or a  $C_1$ - $C_2$  alkyl group, and  $t$  is 0 or an integer equal to 1 or 2, preferably an acetate, more preferably (2-methoxyethyl)-acetate or ethyl acetate;

(e) glymes represented by the general formula  $R_{20}O(R_{21}O)_nR_{22}$ , in which each of  $R_{20}$  and  $R_{22}$  independently represents a  $C_{1-2}$  alkyl group,  $R_{21}$  is  $-(CR_{23}R_{24}CR_{25}R_{26})-$  wherein each of  $R_{23}$ ,  $R_{24}$ ,  $R_{25}$  and  $R_{26}$  independently represents hydrogen or a  $C_1$ - $C_4$  alkyl groups, and  $n$  is an integer from 2 to 6, preferably 3,  $R_{20}$  and  $R_{22}$  preferably being methyl groups,  $R_{23}$ ,  $R_{24}$ ,  $R_{25}$  and  $R_{26}$  preferably being hydrogen or  $C_1$ - $C_2$  alkyl groups, more preferably hydrogen.

6. A method according to ~~any of claims 1 to 5~~ <sup>Claim 1</sup>, in which the electrolyte comprises one or more salts selected from the group of alkali metal or ammonium salts of  $ClO_4^-$ ,  $CF_3SO_3^-$ ,  $AsF_6^-$ ,  $PF_6^-$  or  $BF_4^-$ , preferably  $LiPF_6$  and  $LiBF_4$ .

7. A method according to ~~any of the preceding claims~~ <sup>Claim 1</sup>, in which the electrolyte comprises solvent(s), salts(s) and polymer(s) in the compositional range from 63:25:12 to 94:5:1 percent of the total weight of the electrolyte system, preferably in the compositional

range from 70:20:10 to 90:8:2 percent of the total weight of the electrolyte system, more preferably in the compositional range from 75:17:8 to 88:8:4 percent of the total weight of the electrolyte system.

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8. A method according to ~~any of the preceding claims~~ <sup>Claim 1</sup> in which the electrolyte is confined in a separator consisting of a porous structure made of a polymer, preferably of polyethylene, polypropylene, polycarbonate or cellulose.

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9. A method according to claim 8, in which the separator has a woven or non-woven structure having a pore size in the range of 10 x 10 nm to 1 x 1 mm.

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10. A method according to ~~claim 8 or 9~~ <sup>Claim 8</sup>, in which the separator has a thickness of 10-100µm, preferably 10-25µm.

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11. A method according to ~~any of claims 1 to 10~~ <sup>Claim 1</sup>, in which the electrochemical cell has a negative electrode structure comprising one or more compounds selected from the group of graphite, coke, mesocarbon microbeads, carbon black, aluminium, silicon or tin, preferably graphite, mesocarbon microbeads, coke or carbon black, more preferably graphite or mesocarbon microbeads, and a positive electrode structure comprising one or more compounds selected from the group of lithium manganese oxides, lithium cobalt oxides and lithium nickel oxides, preferably lithium manganese oxides, more preferably lithium manganese oxide  $\text{LiMn}_2\text{O}_4$  of spinel structure.

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CLAIM 1

12. A method according to ~~any of claims 1 to 11~~, in which the dissolution temperature  $T_{\text{dissol}}$  is in the range 45-80°C, preferably 60-80°C, more preferably 65-75°C, and the gelling temperature  $T_{\text{gel}}$  is in the range 75-100°C, preferably 80-90°C, with the proviso, that  $T_{\text{gel}}$  should be higher than  $T_{\text{dissol}}$ .

CLAIM 1

13. A method according to ~~any of claims 1 to 12~~, in which the electrochemical cell is wound prior to electrolyte impregnation.

CLAIM 1

14. A method according to ~~any of claims 1 to 13~~, in which the electrolyte incorporation is carried out by pouring or injection.

CLAIM 1

15. A method according to ~~any of claims 1 to 13~~, in which the electrodes display such a porosity which is such as to allow diffusion of a relatively solvent-rich electrolyte phase into the pores of the electrodes, leaving a relatively polymer-rich electrolyte phase in the volume between the electrodes.

CLAIM 1

16. A method according to ~~any of claims 1 to 15~~ wherein the gap between electrode laminates of the electrochemical cell is smaller than at least the largest polymer particles so that the electrolyte in the vicinity of the edge of the laminate and outside the laminate contains a larger amount of polymer than the electrolyte between the electrodes.

17. An electrochemical cell having a negative electrode structure comprising one or more compounds selected from the group of graphite,

5 coke and mesocarbon microbeads and a positive  
electrode structure comprising one or more  
compounds selected from the group of lithium  
manganese oxides, lithium cobalt oxides and  
lithium nickel oxides, preferably lithium  
manganese oxide, and a gelled polymer  
electrolyte, 1-12% by weight, preferably 4-8% by  
weight, of the total weight of the electrolyte  
being said polymer, which is selected from the  
10 group of homopolymers and copolymers from the  
group of monomers of vinyl fluoride,  
vinylidene fluoride, trifluoroethylene,  
tetrafluoroethylene and hexafluoropropylene,  
preferably a copolymer of vinylidene fluoride and  
15 hexafluoropropylene, said electrochemical cell  
being obtained by or being obtainable by a method  
as claimed in ~~any of claims 1 to 17.~~

Claim 1